

## REMARKS

Reconsideration of the application is respectfully requested for the following reasons:

1. Objection to Drawings Under 37 CFR §1.83(a)

This objection has been addressed by canceling claim 24, since the original drawings do not show ball or roller bearings “in the helical structure” SC100 between the rotor and the shaft (as recited in claim 24 and not claim 25). However, the objection is respectfully traversed with respect to the objections to claims 30-33 and 37 on the grounds that it is impossible to depict “electrical characteristics,” “magnetic coupling,” and “physical properties” of a structure, and that the depiction of the structure itself and a verbal description that the properties vary along the axial length of the structure should be adequate to comply with 37 CFR §1.83(a).

Illustrating the “electrical properties” of a structure is no more possible than illustration of the hardness, elasticity, coefficient of thermal expansion, or weight. It is usual and traditionally acceptable to illustrate the structures that possess the claimed properties, and to simply describe the properties of the illustrated structures in the specification. That is what the applicant has done in the current drawings.

It is noted that the Examiner appears to be confused by the phrase “**along the length**” used in the rejected claims. “Along the length” is an idiomatic English language expression commonly understood to mean **in the direction of** the length. When one proceeds **along the length**, one is proceeding from a point on the rotor to another point in a direction of the axis. This is not a complicated concept, and would easily be understood by those skilled in the art familiar with ordinary English (American) expressions.

The claimed structure is a shaft and rotor that rotate about a fixed axis of rotation, and therefore those skilled in the art would immediately recognize that the “axes” of the illustrated

structures extend in a horizontal direction in each of the drawings except Fig. 2 (in which the axis is perpendicular to the page), and that the axial length is understood to be the length of the respective structure in the direction of its axis. As one proceeds in the direction of the axis, the electrical properties of the rotor (for example, conductivity) change so that the magnetic coupling between the rotor and the stator varies as the rotor is moved in the axial direction of the shaft in response to reverse torque resulting from interaction between the rotor, the magnetic field structure, and a load or driving device.

Since rotor R100 is a cylinder with an unambiguous axis and axial length, there should be no confusion. Further illustration of the length should not be necessary, and a meaningful further illustration does not appear to be possible. The axial length of a rotor is an inherent, clearly defined feature of any cylindrical rotor, and variation of properties in an axial direction inherently refers to variation of properties in a direction parallel to the axis.

Because the invention would be clearly understood from the drawings, and all claimed characteristics of the structures of the invention are illustrated to the extent possible, withdrawal of the objection to the drawings under 37 CFR §1.83(a) is respectfully requested.

2. Rejection Under 35 USC §112, 1<sup>st</sup> Paragraph

This objection has been addressed, in part, by canceling claim 25, although it is respectfully noted that the balls of a helical screw mechanism, which is a well-known type of shaft coupling (*albeit not in the context of the invention*), are obviously situated in the grooves of the helical structure, and that grooves would obviously need to be provided in the rotor as well as the shaft to implement such a helical structure. Helical screw drives of this type are found in numerous mechanical devices and are well-known to those skilled in the art.

The purpose of the drive is to axially displace the rotor along the shaft, and thereby displace it relative to the stator so as to vary the magnetic coupling between the rotor and the

stator. This can be accomplished in a variety of ways, the helical drive being one of the best known and easily implemented.

With respect to varying of electrical or physical properties “**along the length**,” it is respectfully submitted that the phrase “**along the length**” is commonly understood to mean in the direction of the length or axis, and that the invention simply involves a rotor with different properties along its length, *i.e.*, properties that change from left to right in Figs. 1 and 3-19.

With respect to the phrase “length” of the rotor, it is respectfully noted that rotor R100 is a cylinder, and that a cylinder has a single, inherently defined length. The **length of a rotor** is not an ambiguous concept. The claims do not recite a length extending from coil end to coil end. The coils are not part of the rotor and **nothing** in the specification or claims suggests otherwise. The specification clearly describes “rotor R100” and “pre-stressed spring structure SP100.” It is not understood why the Examiner believes that the springs SP100 should somehow be included in the length of the rotor. If there is an ambiguity in the phrase “length of said rotor,” it is because the Examiner is interpreting the phrase in a way that it is unwarranted by the language of the specification or claims, or by common sense. Accordingly, it is respectfully submitted that claims 30-33 and 37 are fully in compliance with 35 USC §112, 1<sup>st</sup> Paragraph, and withdrawal of the rejection is respectfully requested.

3. Rejection of Claims 22-24, 28, and 30 Under 35 USC §102(b) in view of U.S. Patent No. 3,525,005 (Beyers)

This rejection is respectfully traversed on the grounds that the Beyers patent fails to disclose or suggest a rotor arranged to be axially displaced in response to reverse torque resulting from interaction between said rotor, said magnetic field structure, and a load or driving device, and in which displacement of the rotor causes the electrical characteristics of the machine to be varied.

The Examiner will note that the rotor and field structure of Beyers are separated by a variable *axial* gap. In response to reverse torque on the rotor, the axial gap is varied to maintain a **constant output voltage**. In contrast, the claimed rotor is separated from the magnetic field structure by a constant *radial* gap. As a result axial displacement of the rotor alters the magnetic coupling between the rotor and the field structure to **vary** the electrical machinery characteristics. Since the Beyers patent maintains a **constant** electrical output and does **not vary** the electrical machinery characteristics, it is respectfully submitted that the Beyers patent does not anticipate the claimed invention, and withdrawal of the rejection of claims 22-24, 28, and 30 in view of the Beyers patent is respectfully requested.

4. Rejection of Claims 22-27, 29, and 34-36 Under 35 USC §102(b) in view of U.S. Patent No. 2,978,621 (Martinek)

This rejection is respectfully traversed on the grounds that the Martinek patent fails to disclose or suggest a rotor arranged to be axially displaced in response to reverse torque resulting from interaction between said rotor, said magnetic field structure, and a load or driving device, and in which displacement of the rotor causes the electrical characteristics of the machine to be **varied**.

Even though the rotor of Martinek is separated from the field structure by a fixed radial gap, as in the claimed invention, the motor of Martinek differs from the claimed invention in one critical respect: the motor of Martinek is a DC rather than an AC motor. As a result, varying the axial position of the rotor has **no** effect on the electrical characteristics of the motor. Instead, axial displacement of the rotor of Martinek only occurs during start-up, and is included for the purpose of delaying transmission of torque from the armature to the shaft until the armature is up-to-speed in order to avoid undue stress on the motor. This has nothing to do with the claimed invention, and therefore withdrawal of the rejection of claims 22-27, 29, and 34-36 is respectfully requested.

5. Rejection of Claims 22 and 30-33 Under 35 USC §102(b) in view of U.S. Patent No. 925,504 (Porsche)

This rejection is respectfully traversed on the grounds that the Porsche patent fails to disclose or suggest a rotor arranged to be axially displaced in response to reverse torque resulting from interaction between said rotor, said magnetic field structure, and a load or driving device, and in which displacement of the rotor causes the electrical characteristics of the machine to be **varied**. Instead, the power transmission includes a conical rotor having a variable air gap in a manner similar to that of Beyers, discussed above, for the purpose of maintaining a constant speed as the torque applied by the motor, and the reverse torque applied by the load, varies. This has nothing to do with varying the electrical characteristics of an electrical machine, as claimed, and there is **no** suggestion of the claimed **axially varying electrical or physical properties of the rotor**, and therefore withdrawal of the rejection of claims 22 and 30-33 under 35 USC §102(b) in view of the Porsche patent is respectfully requested.

6. Rejection of Claims 22-26, 28, 29, and 34-37 Under 35 USC §102(b) in view of U.S. Patent No. 1,131,551 (Price)

This rejection is respectfully traversed for the same reason as the rejection based on the Beyers patent, namely that the electrical machine of Price is designed to have a **varying air gap** in order to maintain a **constant output voltage**, as explained in col. 1, lines 9-20, rather than a **constant gap and varying electrical characteristics**, as claimed, and therefore withdrawal of the rejection of claims 22-26, 28, 29, and 34-37 under 35 USC §102(b) in view of the Price patent is respectfully requested.

7. Rejection of Claim 25 Under 35 USC §103(a) in view of U.S. Patent No. 2,446,393 (Russell)

This rejection has been rendered moot by the cancellation of claim 25. In addition, it is respectfully noted that electrical machine of Russell moves a screw shaft, and does **not** vary the relative positions of the rotor and field structure, or the electrical characteristics of the motor.

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Withdrawal of the rejection under USC §103(a) in view of the Russell patent is respectfully requested.

Having thus overcome each of the rejections made in the Official Action, withdrawal of the rejections and expedited passage of the application to issue is requested.

Respectfully submitted,

BACON & THOMAS, PLLC



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By: BENJAMIN E. URCIA  
Registration No. 33,805

BACON & THOMAS, PLLC  
625 Slaters Lane, 4th Floor  
Alexandria, Virginia 22314

Telephone: (703) 683-0500

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